

**National Aeronautics and Space Administration
Washington, DC**

NASA ADVISORY COUNCIL

October 12, 2006

**Goddard Space Flight Center
Greenbelt, MD**

MEETING MINUTES



**Christopher C. Blackerby
Executive Director**



**Harrison H. Schmitt
Chair**

**NASA ADVISORY COUNCIL
Goddard Space Flight Center
Greenbelt, MD
October 12, 2006**

**MEETING REPORT
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General Discussion

Senator Harrison H. Schmitt, Chair of the NASA Advisory Council (the Council) called the meeting to order at 8:00 a.m. and welcomed Council members and meeting attendees to the Council's fifth meeting. He reminded everyone that the full Council meeting is open to the public and held in accordance with the Federal Advisory Committee Act (FACA).

The Chair also thanked Dr. Ed Weiler, Director of the Goddard Space Flight Center (GSFC), and his staff in assisting with the logistical planning of the meeting, including an excellent tour of some of the Center facilities on October 11, and emphasized how valuable these visits to the Centers are for the Council's perspectives on various issues before it.

Sen. Schmitt reviewed the recent changes in the membership of the Council. Dr. Paul Robinson is the Chair of the new Space Operations Committee (not present at today's meeting but who chaired the first meeting of his committee the day before). Dr. Edward David is the new Chair of the Science Committee. Dr. Ronald Atlas is the new Chair of the Planetary Protection Subcommittee. The other new members introduced themselves: Dr. Eileen Collins; Dr. John Sullivan; Dr. Thomas Jones; Dr. Alan Stern; Adm. Benjamin Montoya; Dr. Stephen "Pat" Condon; and Dr. Owen Garriott. Dr. Brad Jolliff has been a member since April 2006 and active as a member of the Science Committee and General Chair of the Lunar Science Workshop, but has been unable to be present at a Council meeting until today.

Council member's background, including the newly appointed members and minutes from the last meeting are available on the Council website, www.hq.nasa.gov/office/oer/nac. The Council Charter is also available on the Council's website.

Space Operations Committee Report and Discussion

In the absence of Dr. Paul Robinson, Dr. Condon provided the report on the Space Operations Committee. Other Committee members include: Dr. Collins, Dr. Jones, Dr. David Longnecker (previously on the Exploration Committee), and Adm. Montoya. The Ad Hoc Biomedical Subcommittee has not changed. The Space Operations Committee met yesterday and received full briefings on the status of activities in the Space Operations Mission Directorate from Mr. Bill Gerstenmaier; the Space Shuttle Program from Mr. Wayne Hale; the International Space Station (ISS) from Mr. Mike Suffredini; Human Spaceflight Transition from Mr. Michael Hawes; the Space Communications Program from Mr. Bill Spearing; and Launch Services from Mr. Bill Wrobel. Dr. Condon noted that the Committee had no recommendations at this time.

Dr. Condon shared some of the Committee observations. The decade from 2010 to 2020 will be one of major transitions, including the phase out of Space Shuttle operations. The

Committee asked a number of questions related to what will happen to the ISS during this decade. It is clear that new transportation systems are needed, and during this decade NASA is working on the Commercial Orbital Transportation Services (COTS) program and the Crew Exploration Vehicle (CEV). The Committee had questions about backup plans, delays, and the overall philosophy. All of these events are interrelated and the timing of them is important. The Committee also discussed some of the inconveniences and inefficiencies that relate to the International Traffic in Arms Regulation (ITAR) restrictions. It plans to follow-up on these issues.

The ISS has been given a “National Laboratory” designation by Congress, and the Committee views this as a real opportunity that it will work to understand further. Adm. Montoya was pleased to see that the Space Shuttle and ISS programs appear to be very well coordinated and appreciative of the challenges facing them over this ten year period. Col. Collins noted that the Committee clearly saw the “sunset” of the Space Shuttle Program—the 2010 target date for retirement will be the end of an era. Col. Collins added that the briefing on the transition was very thorough. In response to a question from Sen. Schmitt, Dr. Condon noted that ITAR acts as an inhibitor and the Committee plans further work on this issue. Col. Collins added that Mr. Gerstenmaier cited some specific examples of ITAR-related problems, e.g., with astronauts in training. Sen. Schmitt noted that the Human Resources Committee received a briefing on export control (including ITAR) from Mr. John Hall. He suggested that the Space Operations Committee talk with him also. Gen. James Abrahamson added that there are missile technology control issues for development of rockets. There appears to be a fundamental disconnect between the Space Act and the implementation of ITAR. Mr. Hall is actively working this issue with a team of people and they are searching for the right policy mix for NASA. Sen. Schmitt commented that the full Council might want to have some fact-finding sessions on this topic, and that he would try to work it into the Council agenda for February.

Several topics were identified for follow-up: the ISS utilization/science plan and funding beyond 2016 (the Space Operations Committee will look at this in conjunction with the Science Committee); the Hubble servicing plan; COTS (the Space Operations Committee will look at this in conjunction with the Exploration Committee); ITAR issues; the National Laboratory designation for ISS; and orbital debris. The Committee is discussing the possibility of a fact-finding meeting at the Johnson Space Center (JSC) in early December to further pursue these issues.

Sen. Schmitt noted that the Audit and Finance Committee and the Space Operations Committee have encountered a document that appears to be an artifact of how the budgets are presented through 2016, i.e., the absence of funding for support of ISS beyond 2016 in some publicly presented material. Sen. Schmitt noted that though this appears to be an artifact, some of the international partners are accepting it as fact. The two Committees will pursue an answer to this question. Col. Collins noted that the issue of orbital debris may be more appropriate for the Aerospace Safety Advisory Panel (ASAP), and Sen. Schmitt indicated that the Committee could make a recommendation on this to the Administrator. Capt. Rick Hauck added that there are a number of recent studies on the

subject of orbital debris, some that have been done by the National Research Council. Sen. Schmitt and Mr. Chris Blackerby will find out if this topic is being addressed by the ASAP.

Science Committee Report and Discussion

Dr. David presented the report from the Science Committee. The Committee discussed the future of the Science Mission Directorate (SMD), the Council and Subcommittee recommendations, the SMD Science Plan, the Lunar Science Workshop, and the Lunar Precursor Robotic Program (LPRP). The most recent version of the Science Plan was distributed yesterday. Overall, the response was positive, but there were a number of suggestions on how to improve it. The discussion on the Lunar Science Workshop will continue through the next meeting. The planning is well underway, and the organizing committee is iterating the agenda and developing a list of workshop products. Access to space for medium and small missions is becoming a serious issue that the Council should continue to monitor. Dr. Neil Tyson noted that with a declining market, there may be a shortage of traditional launch vehicles. Sen. Schmitt observed that there are a number of other systems that could be considered. Gen. Lester Lyles added that the situation may be better than perceived, and will probably improve in the future. There are a wide variety of different programs and many companies are interested in providing launch capabilities. He suggested that the Committee take a deeper look into what is available and Sen. Schmitt accepted this suggestion.

Dr. Mark Robinson commented on the recommendations that have been passed up from the Planetary Science Subcommittee. A key issue is the maintenance of healthy and stable Research and Analysis (R&A) programs beyond 2007, including a healthy and stable data analysis program that goes along with the missions. The Mars Science Laboratory (MSL) will be launched in 2009, and there is a huge data set on the ground already from current and previous missions. The MSL will send down data at such a high rate that it will quickly surpass all of the planetary data collected to date. The Subcommittee would like to get a briefing from SMD at the next meeting regarding whether resources will be available to analyze data for site selection and other missions down the road past MSL, as well as to archive the data quickly and make it available worldwide. The Subcommittee expects to come to some conclusion by the February meeting. Dr. Stern added that billions are spent on the missions, but much of the data just goes into a data bank. The ultimate value of the data is what is important, but the resources are not there to turn the data files into scientific results.

Dr. Jolliff read the specific potential recommendation regarding R&A, which was a response to the recent 15% cut in the R&A program. The point is that we need to achieve a balance. The message has been communicated, and it is now a matter of deciding how to deal with it. Dr. Mary Cleave, Associate Administrator for SMD, commented that for Mars in particular, NASA is trying to maintain a launch opportunity every 26 months. However, if the Council would rather see a delay in the missions in order to get more funds in R&A, she said she would like to see such a recommendation. Sen. Schmitt suggested adding the specific issue of data analysis to the R&A recommendation. The Council agreed to move forward with a recasting of the recommendation, along with a background paragraph or two. Capt. Hauck cautioned that sometimes delays do not free up more money, particularly

if there is a “marching army” associated with a mission in development. Dr. Tyson noted that some missions have analysis budgets within them; in addition, there is R&A funding that is not specific to particular missions. The Committee is trying to find the correct balance between the two. Dr. Stern stated that in Astrophysics, where the base data analysis programs are funded within the missions, there are adequate funds. In the planetary missions, it is different—the data is archived and there is a lack of funding to turn that data into results. Skipping a future mission opportunity would open a wedge to solve this problem, and the community feels that it would be worth it. Sen. Schmitt asked Drs. Jolliff, Robinson, and Stern to draft a revised recommendation for the Council based on this discussion.

Dr. Jolliff highlighted two other potential recommendations. The current Science Plan sets forth three targets: Europa, Titan, and Enceladus. The question is: What size missions would provide good science return? The recommendation is to convene a study to look at what can be done with these targets and what it would cost for a mission, e.g., is a flagship mission needed or can it be done within New Frontiers? There is concern in the Planetary Sciences Subcommittee that there might be an attempt to shoehorn the missions into New Frontiers when one or more might require a flagship mission. The second recommendation relates to the New Frontiers Program. This is a vital program and is endorsed strongly by the Subcommittees, but it is fueled by the Decadal Surveys. The recommendation is to update the list of potential candidates for New Frontiers missions before the next call for proposals. In general, there needs to be some method of updating the list without waiting for the Decadal Survey because the Decadal Survey is on a timeline that does not accommodate feedback from the missions. Dr. Stern provided some background on the Decadal Survey and how New Frontiers missions are selected. The New Frontier call is planned to be released in 2008 or 2009. It will be a very significant selection for planetary science. Dr. Robinson added that part of the emphasis is to avoid a situation where there is a lack of cost realism. The intent is to help make the science goals fit within the available funding, whether it is New Frontiers or a flagship mission. Dr. Cleave added that the planetary program is getting into a good feedback cycle, and a formal recommendation would help SMD. Sen. Schmitt agreed that the Committee should craft the recommendation for the Council.

Dr. David raised two other points for the Chairman’s consideration: add a member with Earth Science expertise to the Science Committee, and name a new Chair for the Lunar Exploration Analysis Group, who sits on the Planetary Science Subcommittee. Sen. Schmitt noted that these two issues currently are being addressed with the Administrator. Dr. Tyson added that the Committee was pleased to see the organization and effort that went into the Science Plan. However, the Committee was concerned about the extent of the coordination between the division heads in the SMD and Education and Public Outreach (EPO) activities. There is a recommendation for establishment of a working group for EPO. Sen. Schmitt suggested that Dr. Gerald Kulcinski’s Human Capital Committee take a look at this recommendation. Dr. Tyson added that another issue is a process for evaluation of the value of maintaining a flagship mission that has gone beyond its nominal scientific return. The specific issue to look into is for NASA to develop a process for evaluating the incremental value of extended flagship missions, similar to the

Senior Review that is used for smaller missions. The Science Committee will be looking further at this recommendation. It was noted that ESMD and SMD provided some clarifications that resolved some other potential recommendations.

Exploration Committee Report and Discussion

Gen. Abrahamson reported on the Exploration Committee discussions. Other members of this Committee include: Dr. Wanda Austin, Capt. Rick Hauck, Dr. Stephen Katz, Dr. John Logsdon, and Dr. Longnecker (now on the Space Operations Committee). The NASA support team includes Dr. Louis Ostrach and Ms. Jane Parham. The Committee received an exceptional set of briefings on the Exploration Strategy fact-finding process. Several of the activities have been reported at previous meetings, but there are important new elements. Members participated in the Global Exploration Strategy Workshop in April 2006, a valuable effort that pulled in opinions from the global community. Capt. Hauck briefly reported on the Workshop. ESMD is gathering inputs from potential stakeholders worldwide. In addition to the Exploration Strategy, the Chair of the Committee, General Abrahamson, was previously briefed on ITAR and noted that there are some fundamental issues associated with different methodologies that could use further examination.

Gen. Abrahamson relayed some of the Committee's consensus conclusions. NASA has led an unprecedented, constructive, and extraordinary effort to gather ideas and involve stakeholders in the shaping of the Vision and the Exploration Project. It goes well beyond the process in previous major projects, involving all levels within the Agency interfacing into diverse groups of stakeholders. It is a well documented, traceable, and interactive process. Well-structured scientific goals are evolving from this process, which provides a solid strategy foundation. This holds every promise of a cost effective and systematic progress toward practical but vital goals outlined in the Vision mandate. The Committee had a few observations. Some of the next steps should take place at the Council level, and the Committee is looking at creating a dynamic, independent evaluation process that will lead to actionable advice from the Council to the Administrator. As a first step, the Committee is considering a type of workshop that parallels the Council and Science Committee evaluation milestones. Gen. Abrahamson invited feedback from the Council on this course of action. Capt. Hauck responded that the Committee discussed a process of initiating Subcommittees that is analogous to the Science Committee, but is hesitating to pursue that direction at this point. One possibility would be to institute a Committee assessment or evaluation of the traceability of the lunar elements into the Mars elements. The Committee could also work on an understanding of the broader forces in the budget in order to ensure balance within the program.

In response to a question from Sen. Schmitt, Gen. Abrahamson indicated that the architecture should include a broader concept on how a return to the Moon could be accomplished. The Committee should be able to evaluate this architecture. Sen. Schmitt commented that the global lunar outreach does not seem to be included in the initial portion of the LPRP. Gen. Abrahamson noted that this decision has not yet been made, but the Committee will be able to evaluate the decision-making process and the consequences of that decision. It will bring in whatever expertise it needs, independent of the other efforts, as well as draw upon the expertise of the Committee members. The Exploration

Committee will be able to bring a finding and recommendation to the Council. Dr. Jolliff added that it has been clear to the Science Committee that Exploration is not driven by science. In terms of science, the community can articulate the objectives; however, it is waiting with anticipation for the roll-out of the strategy in December. A key question is: What are the exploration objectives? Gen. Abrahamson agreed that his Committee would pursue that question. One of the ways the Committee will address the appropriate balance is to look at the long-term process and evaluate where the resource limitations will come from and how they will be resolved.

Capt. Hauck added that the Committee was briefed on the status of the lunar exploration architecture. The process has not gone sufficiently far enough to present an answer or a detailed plan at this time; however, the Committee will have a process in place to make an assessment when that architecture is presented. The Committee has talked about the possibility of a workshop or some other form of discourse with the broader community. It will engage Mr. Doug Cooke, Deputy Associate Administrator, ESMD, soon on how the Committee process could be more effective. Sen. Schmitt emphasized that the evaluation will take some preparation and some independent thought in order for the Council to do its assessment.

Gen. Abrahamson noted that the Committee is identifying some of the problems in the ITAR process. Selective cross-committee issues, e.g., COTS, are being worked. In terms of near-term payoff, the Committee is very enthused about the Long Term Human Spaceflight Medical Project. Dr. Longnecker summarized some of the thoughts of the ad hoc biomedical subcommittee. In previous recommendations, the subcommittee asked NASA to develop a biomedical research plan, and those actions are underway. It also recommended that NASA explore with the National Institutes of Health (NIH), and other organizations and agencies, the opportunities for collaborative research efforts. Dr. Longnecker focused on the actions of the subcommittee in fostering the second recommendation—a proposal for an interagency Space Life Sciences Conference. This idea has been developed collaboratively by members of the ad hoc subcommittee, led by Dr. Katz. The goals are: to seek common areas of strategic interest between NASA and other agencies that have significant commitments to health-related research; to illustrate potential valuable inter-agency resources; and to explore areas of common strategic interest that might lead to some tactical planning downstream. Organizations invited to participate include: NIH, the National Science Foundation (NSF), the Food and Drug Administration (FDA), the Defense Advanced Research Projects Agency (DARPA), the Department of Defense (DOD), the National Institute of Science Technology (NIST), and the National Space Biomedical Research Institute (NSBRI). Directors of centers and institutes have been invited, as well as the senior leadership from the other organizations. Other participants include the members of the Exploration Committee and the biomedical ad hoc subcommittee, Sen. Schmitt, and representatives from NIH and NASA.

The key questions for the upcoming meeting are: What are the current areas of space related health research in your organization? Are there space related health research resources that could be better leveraged to foster this research? What are the most promising future research areas for space related health research collaborations? In the

early part of the session, NASA will lay out some of the Earth benefits realized from space-based research, e.g., mammography techniques and important understandings of osteoporosis. In response to a comment from Dr. Tyson, Dr. Longnecker agreed that even within NIH there are varying levels of enthusiasm for the leveraged approach. However, this is a good start to begin to explore areas of common interest, and one or more areas may be identified where there could be future collaborations. It will not be a conference where people make presentations; rather, the structure of the forum will be to encourage dialogue. Gen. Lyles encouraged the subcommittee to extend invitations to the individual services within DOD as well as with the Pentagon in general. He offered to provide specific points of contact.

Aeronautics Committee Report and Discussion

Mr. Neil Armstrong reported on the Aeronautics Committee discussions. The Committee's primary effort was to get a status report from NASA and the Air Force on thermal protection systems (TPS). Gen. Lyles discussed the USAF perspective on thermal protection technology. Dr. Ravi Chona and Dr. Andy Swanson made the presentation to the Committee. For many reasons, the Air Force has formed "focused long term technology areas." Dr. Lyles reviewed the Air Force technology areas related to thermal protection. The focus areas are widely varied. They include leading edge thermal technology, seals, blankets, tiles, structure, coatings, etc. The key emphasis areas are: small radius leading edge solutions (ramifications here for Shuttle or an entity entering Mars atmosphere); increased TPS durability; increased TPS operability; reducing parts count and minimizing TPS structure; and integrated structural health monitoring. The primary technology readiness levels (TRLs) were 4-6. The key question is how to transition into a real capability. The next step is an airframe health monitoring demonstration that will demo some of the key technology areas to prove that they are ready to be transitioned to a specific program. The Committee looked at short duration applications for TPS.

Gen. Lyles noted that there is another area that fits a need for the Air Force—"prompt global strike"—dealing with aerospace vehicles or other vehicles that will have long duration cruise or flight times. This fits with the longer term needs of NASA, particularly planetary exploration. The Air Force's primary focus is towards increasing durability and operability, demonstrating high-performance leading edges, lower weight, and integrated health maintenance. One of the gap areas is producibility—the time required to make a TPS that incorporates the latest technologies. What is really needed for the future is something that incorporates and integrates structural capabilities with TPS. There is a lot of opportunity for cooperation with NASA in this area. The Committee is considering a potential recommendation. One question from the Committee to the Air Force was: Are you aware of the TPS requirements for NASA? It was not clear that the Air Force is aware of where NASA is currently going for the CEV. Air Force capabilities have synergies for NASA in the future, but they have not been harmonized as well as they could be. It would be helpful if NASA could look at the AFRL's "TPS Approach." The potential Committee recommendation is that NASA consider establishing a "TPS Technology Consortium" (with DOD and others) similar to the Integrated High Performance Turbine Engine Technology program to share critical technology needs, ideas, and programs.

In response to a question, Gen. Lyles noted that the research and development of technology still goes on in the Air Force Materiel Command. Former Commander Kevin Shelton would be a good contact at the Space Command. Funding and maintenance of critical facilities for both NASA and DOD need to be addressed, and this should be put back on the Aeronautics Committee agenda. As noted earlier, creation of a long term manufacturing capability for TPS needs to be addressed. Dr. Condon applauded the Aeronautics Committee for focusing on this issue. There must be an emphasis on manufacturing readiness as well as technology readiness. Dr. Eugene Covert suggested that one of the things that is needed on the academic side (and that some universities are beginning to address) is more attention on manufacturing so that it attracts students' attention. Sen. Schmitt agreed that the Council would expect the Committee to build on the background of the recommendation and bring it forward.

Mr. Armstrong reported that the Committee also received a briefing from Dr. Bernard Laub on ablative TPS. NASA R&D has generally focused on reusable TPS, although during the Mercury/Gemini/Apollo era, ablators were required. When work focused on the Shuttle, ablators declined and the ablator community seriously diminished. Mr. Armstrong showed a summary of NASA's ablators throughout history and those that are no longer available. In over 40 years, NASA entry probes have only employed a few ablative TPS materials. Half of these materials are (or are about to become) no longer available. Some of the ablative technology on Apollo and Gemini has been lost or forgotten. One of the Orion challenges, thus, is the heat shield. Ames Research Center (ARC) plans to help the Orion prime contractor design and build the Orion TPS by initiating an Advanced Development Project to reduce the risk of a lunar-direct-return (LDR) capable heat shield.

In response to a comment from Sen. Schmitt, Mr. Armstrong noted that there are uncertainties associated with the ability to predict the heat rates during entry. Sen. Schmitt observed that one of the ways in which the CEV can play into the Mars program is to use the CEV as a research device. Mr. Armstrong stated that materials are currently available to manage the heat level for lunar return; however, there are manufacturing issues and some work needs to be done in this area. Mr. Armstrong provided a summary of the TPS needs for future human return missions vis-à-vis the existing ablators available. He also showed the total heat load and mass fraction for planetary missions. There has not been much ablative work done over the last 25 years; however, the good news is that the small ablative community that does exist is working very hard.

The Committee concluded that there are no show stoppers on addressing this problem, but a lot of work needs to be done. One thing that the Committee needs to look into is the facility needs for the future. Sen. Schmitt observed that one of the thoughts for testing Mars systems would be upper atmosphere tests, and the architecture might address this. Gen. Lyles indicated that this would be a critical experiment that should be included in the plans, and the Exploration Committee might want to look into this area. Dr. Covert noted that one of the problems with facilities development is that it often takes longer to develop the facility than the timeframe available to do what is needed. One thing to keep in mind about ablatives is that they result in something that will not be a fully reusable spacecraft,

since the ablative surface must be replaced every time it is used. Gen. Lyles suggested that one of the things to do in conjunction with the Exploration Committee is to look at what the Lockheed team proposed for this effort. Sen. Schmitt commented that he thought the TPS issue is being addressed in-house, and this makes it even more important to understand the facility issues and funding, etc. Dr. Stern added that the manufacturing issues are very severe for some of the outer planetary missions as well. The next big Mars lander, MSL, has just added an instrumentation package to the heat shield to try to understand the mass fraction and transfer issues. This may be of interest to the Aero Committee. Dr. Sullivan emphasized the importance of basic molecular level research, and Gen. Lyles agreed that there is a huge gap that needs to be addressed by all of the communities. (Based on a side comment from Dr. Garriott, Sen. Schmitt agreed on the need to find out what the baseline is (English or metric) for the Exploration missions.)

Mr. Armstrong stated that in previous meetings, the Council talked about the reaction of outside bodies to NASA's overall Aeronautics Program. The Committee feels that more industry reaction is needed, and it had an opportunity to talk with industry representatives on the previous day. People from different segments of industry provided their perspectives. Dr. Covert summarized the information collection session with industry. The industry participants represented the Aircraft Industries Association (AIA), a small aircraft company, a medium-sized helicopter company, and a large commercial aircraft company. The general consensus was that industry would like to have NASA listen to them regarding the most important problems. Generally speaking, the reaction to increased cooperation was quite high. The two issues were: 1) intellectual property; and 2) ITAR, particularly the hiring of non-US citizen engineers. In all of the technology endeavors, a consistent long-term program is necessary. In the case of the helicopter, collaboration is non-existent. Bell has not received any funds from NASA in the last few years. At one time, there was a joint helicopter industry/Army/NASA collaboration that would select the important programs to be funded. Helicopters failed to make the cut in the NASA budget, and the helicopter companies withdrew support because they could not make up the difference.

Some gaps exist in industry areas of interest regarding funding to cover TRL 4 to a maturity level that is attractive to the market. The AIA is interested in increasing NASA's aeronautics budget. However, one of the obstacles is that during the Reagan Administration, the Heritage Foundation issued a report that concluded that aeronautics is a "sunset" industry, so no government support is appropriate. Ever since then, it has been difficult to put this myth to rest. The Committee concluded that when practical, NASA-industry collaboration is of benefit to both parties. Industry input would be especially valuable during the planning cycle. Dr. Sullivan noted that there was a unified response from the industrial sector. What they are looking for is for NASA to be an integrator or facilitator on team projects. There may be a model from the Exploration community on how things could be addressed in the Aeronautics community.

Mr. Howard Stanislawski indicated that he was interested in hearing more about intellectual property in a non-contractual context. Mr. Armstrong noted that when industry gave examples of successful collaborative processes, the biggest concerns in those projects were intellectual property rights. Dr. Sullivan commented that the real issue is that

industry feels that they are not being included in aeronautics. One of the principle points was that NASA was not living up to its charter in the Space Act of 1958, e.g., the preservation of the role of the US as a leader in aeronautics and space science.

Gen. Lyles noted that in the first meeting of the Council, Dr. Griffin cited the need for a national aeronautics policy. Such a policy is being developed and should come to fruition in December 2006. One of the things the Committee could do is look at the draft policy before it becomes final. Dr. Covert added that the representative from the AIA has seen the draft and there is a point of contention. The Europeans have a 20-year plan that they are funding. Their goal is to be a leader in aeronautical technology by 2020. Mr. Armstrong noted that if the US is going to live up to the Space Act, in which it reads NASA will preserve the “role of US as a leader in aeronautics and space science,” the program must be allowed to find ways of growing in the future. This is a serious threat. Dr. Lyles noted that the draft policy should be available, and Sen. Schmitt agreed that the Council should see it. Gen. Abrahamson noted that the administration of the ITAR has a definition of the “intellectual property boundary,” and there are significant implications of that boundary. Sen. Schmitt suggested that the Council’s future ITAR discussions include the intellectual property boundary.

Audit and Finance Committee Report and Discussion

Mr. Robert Hanisee reported on the briefings to the Audit and Finance Committee. He introduced the other Committee members: Mr. Ted McPherson, Mr. Michael Montelongo, and Mr. Howard Stanislawski. He briefly restated NASA’s accounting and control problems (failed audits and out of balance accounts with Treasury). The roots of the problems go back to NASA’s former “stovepipe” organization that had 10 different financial control systems and 120 different subsystems. In October 2005, the General Accounting Office (GAO) put NASA on its “high risk” list and had 45 recommendations. An Integrated Enterprise Management Plan (IEMP) was adopted in 2003 after two earlier failed attempts, along with installation of the SAP financial records and reporting software.

The Committee is still in fact-finding mode. The cut-over to the upgrade to the SAP system is scheduled for November 13, 2006. The Committee conducted a telecom with the IEMP Program Manager on October 10 regarding the status. So far, NASA has gone through 3 mock closings and 9 data migrations. Training is exceptionally important. One of the nagging problems has been the issue of property tracking, both at NASA and contractor sites. Unfortunately, this upgrade does not provide much functionality for resolving this issue. However, NASA has been pursuing a system used by DOD that offers more promise. The GSFC team reported that it has worked with vendors to make them aware of the cut-over and is facilitating payment of invoices and other related processing before the conversion. There are several challenges: reimbursables, data migration, and training. If all else fails, there is a recovery plan—the cut-over date could be delayed. For a major failure, NASA could revert to the old version of SAP; however, NASA is committed to making this system work. So far, there are no show-stoppers. Mr. Hanisee noted that GSFC is not quite as optimistic as NASA Headquarters. The Office of the Inspector General (OIG) has been continually involved in the process, and Center Directors have been briefed weekly.

Yesterday, the Committee met with the Deputy Chief Financial Office (CFO), Terry Bowie, who is leading the charge in resolving the problems. He briefed the Committee on the year-end audit. The push is on to get funds in balance with Treasury, and a lot of progress has been made. The community has a better understanding of what needs to be done. It looks like NASA will be able to get in balance with Treasury at the end of the year. Equally important, NASA feels that it will be able to provide Treasury with all of the year-end reports on schedule. The external auditor, E&Y, found no deficiencies. "Legacy," that is, corrupt old data in the system, still plagues everyone, although many of the former significant problems are now minor ones. The Committee has a sense that although NASA may not quite get there by end of year, there will be substantial progress, and there is every confidence that NASA will get there in 2007. Mr. Hanisee stated that the key to this was leadership and a core group of people that could hold together long enough to accomplish the work.

Mr. Hanisee noted some of the lingering issues: asset accounting; one-NASA; and staffing problems. As noted before, the asset accounting problem is due to some corrupt legacy data in the system. The CFO's office has proposed a new regime: assets launched into space will be written off immediately. Proposals have been made to the appropriate regulatory offices and the Cost Accounting Standards Board. Assets like the HST, which can be serviced, will be kept on the books. There is a high probability that NASA will get approval for the new regime, but it will not be applied to 2006. Another troubling issue is the high rate of staff turnover in the NASA accounting office. Headquarters is still 20 bodies below its authorized count. This needs to be addressed in the near future. Capt. Hauck observed that there is a high turnover in private accounting firms as well. Mr. Hanisee observed that there is a severe shortage of accounting professionals in the US.

The Committee met with the GAO on Oct. 11. GAO says that the real goal is to provide the Administrator with full, clean, and accurate financial statements. If NASA can do that, a clean audit report will result. Programs transcend many years and across many Administrations. GAO felt that there needs to be a Chief Management Officer that doesn't come and go with changes in Administrations. Mr. Hanisee indicated that the Committee will take this as an item for study. Mr. Montelongo noted that GAO made a similar recommendation to DOD. Presently, the management functions are "owned" by a political appointee rather than a career civil servant. Sen. Schmitt stated that the leadership of an Agency will always be a political appointee, and that person will have his or her own ideas on management. Every leader wants to have the opportunity to name the person who will have the senior management function. Sen. Schmitt encouraged the Committee to look at this idea, but indicated that he thought there would be very difficult hurdles to overcome. Other members concurred.

Mr. Hanisee noted that GAO is still concerned about the high level of unobligated balances, the IEMP/SAP upgrade; the financial management environment; one-NASA and Center stove-piping; and property plant and equipment (PPE). In response to a question from Sen. Schmitt, Mr. Hanisee indicated that the GAO did not appear to understand the concept of a "management reserve." Dr. Griffin has mandated that all new starts will have

a 30% management reserve, and there has to be some way to attach funds to programs more quickly in their life cycle. Gen. Lyles recommended that NASA look at how DOD has handled this issue. GAO has a deep concern about ending the stove-piping at the Centers, and felt that it is essential that the NASA Administrator and senior management stay on top of this issue. With respect to PPE contractor reports, part of the problem is that the two current types of reports (1018 and 533) are not reconcilable. The Committee is going to look at the feasibility of a type of report that could serve both purposes.

The Committee met with GSFC financial staff and learned that GSFC does all of the financial services and processing for the Jet Propulsion Laboratory (JPL) and Headquarters as well as GSFC. About 72% of all of NASA's grant awards are administered through GSFC. GSFC has the largest volume of transactions in the Agency. The NASA Shared Services Center (NSSC) at Stennis Space Center (SSC) will eventually take over all of the processing, but that presents another set of problems. This is another issue that the Committee wants to look into. The transactions should not be sent to SSC until the processing is much smoother. The GSFC staff indicated that they are not sure that GSFC can meet the cut-over date. A Committee meeting at Stennis may be appropriate.

Mr. Hanisee reviewed some of the prior recs. The recommendation on the CFO chain of command (a dual reporting line for the Center CFO) is somewhat contrary to the NASA institutional management model. There may be some impediments to what the Committee recommended, and the Committee intends to stay on top of this. Another recommendation related to holding the CFO staff more responsible, and this is being done. NASA has sufficiently addressed the recommendation on environmental liabilities. The JSC error tracking tool (a way to track errors before posting to the general ledger) was recommended for system-wide implementation, and NASA has responded well to this recommendation. NASA intends to look around the Agency and see what other tools are being used, and pick the best ones for the whole organization. The roll-out is scheduled for December. The Committee had also recommended that NASA consider implementing a customer satisfaction tool. Mr. McPherson indicated that in his experience, a lot of value was captured by the customer satisfaction tool, and he explained how this was done in his company. NASA has responded favorably to the idea.

Mr. Hanisee presented the Committee's "to do" list. It intends to have a debriefing with the OIG and E&Y when the audit is complete. There will be a fact finding meetings about the Stennis NSSC, grants accounting, and unobligated balances. The Committee will continue review and analysis of financial and control systems, and as well as review of financial management plans for several projects: CEV/Orion, CLV, COTS, and ISS. In conclusion, real progress has been made, and ending the year in balance with Treasury will be an enormous achievement for the Agency. NASA is in far better financial controls condition than it was a year and a half ago.

Human Capital Committee Report and Discussion

Dr. Kulcinski reported on the Human Capital Committee discussions. Other members include Ms. Joann DiGennaro (not present at this meeting), Ms. Kay Coles James, Mr. Wendell Maddox, and Dr. James Milgram (attended via telecon). Dr. Kulcinski discussed

the Committee's activities since the last meeting, the meeting with NASA's Office of External Relations, and changes in NASA's Office of Education. He noted that the Committee has no further recommendations at this time. It is awaiting responses on its previous recommendations before presenting any new ones to the Council.

Since July, members of the Committee met with NASA's Office of Education staff in Washington, DC, and attended a National Research Council (NRC) Education Summit. The theme of the Summit was identifying and engaging gifted and talented students. One of the reasons for concern has been a significant drop-off in the participation in the Math Olympiad. The Committee was surprised to learn that while there was a consensus that the U.S. needs to boost the number of science, technology, engineering, and mathematics (STEM) graduates, there was little agreement on how to achieve this goal. Surprisingly to the Committee, there is a great deal of resistance to advancing gifted and talented education. More than half the participants at the Summit believe that gifted and talented students should not be the focus of special attention, and NASA's approach seems to fall into this model. The Federal Government is spending about \$65 billion on kids "at risk," but only \$9 million is being spent on the gifted and talented.

The Committee made several observations. Top achievers in the U.S. educational system are often inadequately challenged. Curriculum is usually developed for the average student, thus limiting the educational experience of gifted students. There are several national programs for gifted students that could serve as models for NASA, e.g., the Education Program for Gifted Youth (a Stanford University program), Math Circles (a very successful program in Russia), and First Robotics (a NASA program). The Committee will identify one or more such programs to recommend to NASA. Dr. Covert opined that with respect to the gifted and talented, separate tracking is probably not a good idea.

Sen. Schmitt noted that a major program at the University of Colorado involves gifted students in handling tools and, as a team, building payloads. Dr. Kulcinski observed that the Space Grant Consortia are also doing something similar. He agreed that the Committee would try to get a listing of the successful programs for gifted and talented students. Gen. Lyles noted that the Aldridge Commission discussed STEM and felt that NASA should not be solely burdened with stimulating STEM graduates. The Department of Education has been given the mandate to do this, with support from NASA. It might be worthwhile to go to the Department of Education and find out what they have done on the President's charge. Dr. Kulcinski indicated that Dr. Milgram has done this. The Department of Education was behind the NRC meeting.

The Committee had a detailed discussion with Mr. John Hall, Director of NASA's Export Control and Interagency Liaison Division, on export control. Dr. Kulcinski echoed the suggestion that the entire Council get a briefing on this topic. The Committee discussed International Traffic in Arms Regulations (ITAR), Export Administration Regulations (EAR), Missile Technology Control Regime (MTCR), IP policy, etc. Export control includes the exchange of information with non-U.S. persons, even if the information exchange occurs in the U.S. Mr. Stanislawski commented that there are many obstacles

associated with export control and a very detailed discussion is necessary to understand it fully.

The Committee also discussed the foreign national access policy. There were several observations. In the past, NASA has not taken advantage of the enormous talent pool of gifted foreign nationals graduating from our universities. Out of about 16,000 NASA employees, only 12 foreign nationals were sponsored by NASA under the Exchange Visitor (J-1 visa authority) Program last year, 25 this year. NASA has, also, been granted authority, as an exception to Government-wide regulations, to hire up to 150 foreign scientists having special qualifications where such employment is deemed by the Administrator of NASA to be necessary and in the public interest. Currently, there are only 8 foreign nationals employed by NASA under this authority. Mr. Hall stated that the President's invitation to non-U.S. countries to participate in the Vision for Space Exploration may allow the U.S. to fund research outside the U.S. It was mentioned that this approach may create complications with US researchers. If that happens, funding of gifted foreign graduates in U.S. universities may be possible. This would have a huge effect in involving gifted students in the space program. The Committee intends to pursue this subject at the next meeting and will probably come back with a recommendation. Ms. James noted that there should be a short-term strategy to get foreign students into NASA contracts; long-term, we need to stimulate more students in STEM. Capt. Hauck noted that the state of Massachusetts has mandated that all students in public high schools be exposed to engineering education. NASA could try to encourage this in other states.

Dr. Kulcinski discussed the personnel change in the Office of Education. Yesterday, NASA announced the selection of a new Assistant Administrator for Education, Dr. Joyce Winterton. This is the third change since the Council was formed. Before joining NASA, Dr. Winterton was Director of National Education Programs for *USA Today*. The Committee is looking forward to working with her and would like to meet with her as soon as possible to discuss the future of NASA's education programs. It wants to investigate ways to understand and challenge the educational communities' conventional wisdom on gifted and talented students. The Committee will work with the Science Committee on the transfer of results from the Lunar Science Workshop to the larger scientific community and the public. The Committee is waiting for feedback on its previous recommendations.

Sen. Schmitt noted that one of the significant issues is how all of the related education areas get a single senior management focus.

Council Discussion and Agreement on Recommendations

Science Committee:

- 1) Undertake in-depth studies to evaluate mission concepts and technologies for potential outer solar system missions, as needed to achieve the science objectives.
- 2) Establish a process of regularly updating potential targets for New Frontiers missions before the next New Frontiers program competition.

Dr. Jolliff noted that he would try to come up with some ideas for potential implementations of these recommendations. Sen. Schmitt indicated that he and Chris would work with Dr. Jolliff on this.

Aeronautics Committee:

- 3) Establish a TPS technology consortium with DOD and others similar to the Integrated High Performance Turbine Engine Technology Program to share critical technology needs/ideas/programs.

Dr. Covert noted that while low Earth orbit (LEO) launch systems are not new science, a lot of work is involved to have dependable, highly reliable systems. Gen. Lyle added that the Committee would also like to review the national aeronautics policy if it can get a copy. In response to a question from Collins regarding what the Administrator gets as a “product” from the Council meetings, Sen. Schmitt stated that in addition to the minutes, the Administrator will receive the Council recommendations, with background information, as well as a cover letter. In addition, he briefs Dr. Griffin on the meeting.

Sen. Schmitt noted that the Council is looking at adding another day to the meeting in February; the dates would be February 6-8, 2007, in Washington, DC. Dr. Stanislawski has volunteered to be a resource to anyone who is interested in ITAR and related issues. Gen. Abrahamson observed that when the Council meeting is held at field Centers, there is a lot of education in the tours. He suggested that the Council try to find some way to get extra time for more interaction.

Sen. Schmitt adjourned the meeting at 4:10 pm.

**NASA Advisory Council Meeting
Goddard Space Flight Center
Greenbelt, MD
October 12, 2006**

Meeting Location

NASA Goddard Space Flight Center
Bldg 1, Room E100 D and E
8800 Greenbelt Road
Greenbelt, MD 20771-0001

Thursday, October 12th

8:00 a.m.	Space Operations Committee Report and Discussion	Dr. Pat Condon
9:00 a.m.	Science Committee Report and Discussion	Dr. Edward David
10:00 a.m.	Break	
10:15 a.m.	Exploration Committee Report and Discussion	Gen. James Abrahamson
11:15 a.m.	Aeronautics Committee Report and Discussion	Mr. Neil Armstrong
12:15 p.m.	Lunch	
2:00 p.m.	Audit and Finance Committee Report and Discussion	Mr. Robert Hanisee
3:00 p.m.	Human Capital Committee Report and Discussion	Dr. Gerald Kulcinski
4:00 p.m.	Council Discussion and Agreement on Recommendations	
4:30 p.m.	Adjournment	

NASA Advisory Council Members

October 12, 2006

Chair	<ul style="list-style-type: none"> Hon. Harrison H. Schmitt, Apollo 17 Astronaut and Scientist
Aeronautics Committee	<ul style="list-style-type: none"> <i>Chair: Mr. Neil Armstrong, Apollo 11 Astronaut</i> General Lester L. Lyles, USAF (Ret.), Consultant, The Lyles Group Dr. Eugene Covert, T. Wilson Professor of Aeronautics, Emeritus, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology Dr. John Sullivan, Professor of Aeronautics and Astronautics Director of the Center for Advanced Manufacturing, Purdue University
Audit and Finance Committee	<ul style="list-style-type: none"> <i>Chair: Mr. Robert M. Hanisee, Trust Company of the West</i> Hon. Edward R. "Ted" McPherson, Chief Executive, Intersolve Group, Inc. Hon. Michael Montelongo, Senior Vice President, Strategic Marketing, Sodexo Inc. Mr. Howard J. Stanislawski, Partner, Sidley Austin, LLP
Exploration Committee	<ul style="list-style-type: none"> <i>Chair: Lieutenant General James A. Abrahamson, USAF (Ret.)</i> Dr. Wanda M. Austin, Senior Vice President, National Systems Group, The Aerospace Corporation Capt. Rick Hauck, USN (Ret.) Dr. Stephen I. Katz, M.D., Ph.D., Director, National Institute of Arthritis and Musculoskeletal and Skin Diseases Dr. John M. Logsdon, Director, Space Policy Institute, George Washington University
Human Capital Committee	<ul style="list-style-type: none"> <i>Chair: Dr. Gerald L. Kulcinski, Associate Dean of Research, College of Engineering, University of Wisconsin-Madison</i> Ms. Kay Coles James, President, The Gloucester Institute Mr. Wendell Maddox, President and Chief Executive Officer, ION Corporation Dr. R. James Milgram, Professor, Department of Mathematics, Stanford University
Science Committee	<ul style="list-style-type: none"> <i>Chair: Dr. Edward David, President, EED, Inc.</i> Dr. Owen Garriott, Astronaut (ret.) Dr. Bradley Jolliff, Research Associate Professor, Department of Earth and Planetary Sciences, Washington University Dr. Mark S. Robinson, Research Associate Professor, Department of Geological Sciences, Northwestern University Dr. Alan Stern, Executive Director, Space Science and Engineering Division, Southwest Research Institute Dr. Neil DeGrasse Tyson, Frederick P. Rose Director, Hayden Planetarium, Department of Astrophysics, American Museum of Natural History
Space Operations Committee	<ul style="list-style-type: none"> <i>Chair: Dr. C. Paul Robinson, Former President and Director, Sandia National Labs (Ret.)</i> Col. Eileen Collins, Astronaut (ret.) Dr. Pat Condon, Chairman of the Board, Air Force Association Dr. Thomas Jones, Astronaut (ret.) Dr. David Longnecker, Institute of Medicine, National Research Council Adm. Benjamin Montoya, DEO, SmartSystems Technologies
<i>Ex-Officio</i>	<ul style="list-style-type: none"> Dr. Raymond S. Colladay, Chair, Aeronautics and Space Engineering Board, National Research Council Dr. Lennard A. Fisk, Chair, Space Studies Board, National Research Council
Unable to Attend	<ul style="list-style-type: none"> Ms. Joann DiGennaro, President, Center for Excellence in Education (Human Capital)

NASA ADVISORY COUNCIL**Goddard Space Flight Center****Greenbelt, MD****October 12, 2006****MEETING ATTENDEES*****Council Members:***

Schmitt, Harrison H. (<i>Chair</i>)	Astronaut and Scientist
Abrahamson, James	USAF (Ret.)
Armstrong, Neil	Astronaut and Scientist
Blackerby, Christopher (<i>Executive Director</i>)	NASA Headquarters
Collins, Eileen	Astronaut (ret.)
Condon, Pat	Air Force Association
Covert, Eugene	Massachusetts Institute of Technology
David, Edward	EED, Inc.
Garriott, Owen	Astronaut (ret.)
Hanisee, Robert M.	Trust Company of the West
Hauck, Rick	USN (Ret.)
James, Kay Coles	The Gloucester Institute
Jolliff, Bradley	Washington University of St. Louis
Jones, Thomas	Astronaut (ret.)
Kulcinski, Gerald	University of Wisconsin-Madison
Logsdon, John	George Washington University
Longnecker, David	IOM, National Research Council
Lyles, Lester	USAF (Ret.)
Maddox, Wendell	ION Corporation
McPherson, Edward R.	Intersolve Group
Montelongo, Michael	Sodexo, Inc.
Robinson, Mark	Northwestern University
Stern, Alan	Southwest Research Institute
Sullivan, John	Purdue University
Tyson, Neil DeGrasse	American Museum of Natural History

NASA Attendees:

Allen, Marc	NASA Headquarters
Cleave, Mary	NASA Headquarters
Dunwoody, Cathy	NASA Headquarters
Farrell, Kelly	NASA Headquarters
Flaherty, Chris	NASA Headquarters
Green, Thomas	NASA Headquarters
Hildebrand, Peter	NASA/GSFC

Palmer, Jennifer
Perkins, Kendra
Schuman, David
Stubbs, Tim
Vondreck, Richard
Weinstein, Beth
Zukor, Dot

NASA Headquarters
NASA Headquarters
NASA Headquarters
NASA/GSFC
NASA/GSFC
NASA/GSFC
NASA/GSFC

Other Attendees:

Beres, Kathleen
Beyer, Ron
Bradley, Andrew
Cowing, Keith
Day, Dwayne
Golburt, Yaning
Harrison, Steve
Hauser, Michael
Herberger, Kelly
Karanian, Linda
Karls, Kristi
Kelly, Miriam
Kronmiller, T.
Kunitz, Chris
Lane, Carol
Lawler, Andrew
Ludwig, Kurt
Malay, Jon
Raney, Patricia
Reed, Cheryl
Zelinski, Sarah

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EOS/AGU

**NASA ADVISORY COUNCIL
Goddard Space Flight Center
Greenbelt, MD
October 12, 2006**

LIST OF PRESENTATION MATERIAL¹

- 1) Space Operations Committee [Condon]
- 2) Science Committee [David]
- 3) Exploration Committee [Abrahamson]
- 4) Aeronautics Committee [Armstrong]
- 5) Audit and Finance Committee [Hanisee]
- 6) Human Capital Committee [Kulcinski]

Other material distributed at the meeting:

- 1) NASA Advisory Council Minutes, July 20, 2006
- 2) Charter of the NASA Advisory Council
- 3) Biographies of new NASA Advisory Council members

¹ Presentation and other material distributed at the meeting is on file at NASA Headquarters, OER/ACMD, 300 E Street SW, Washington, DC 20546.